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5.0 PROGRESS SINCE THE LAST REVIEW

This is the first Five-Year Review for OU2 and the third for OU1. The previous Five-Year Review for OU1 (B&RE, 1997) concluded that the remedial action selected for the Kellogg-Deering Well Field was protective of public health and the environment, and that ongoing maintenance activities of the air stripping facility appeared to be satisfactory to maintain the protectiveness of the remedy.

The following requirements of the OU1 ROD/AO were not being met in 1997 at the time of the last Five-Year Review:

- Sampling of the monitoring wells east of the Norwalk River was not being conducted. EPA determined that since these wells would be sampled as part of the O&M activities for OU2, sampling of these monitoring wells by NFTD was not necessary. STATUS: The six wells located east of the Norwalk River that were to be sampled per the AO have not been sampled since the last five-year review. Neither NFTD nor the firm responsible for the O&M at OU2 were aware of the requirements to collect samples from these wells. However, monitoring wells K-6A, K-6B, K-21, K-22A, K-22B, and K-24 (which are all located east of the Norwalk River between the SRA and OU1) have been sampled yearly since 1993 as part of the O&M for OU2 (see Figures 4-1 and 4-3).

- Sampling of air emissions from the air stripping unit was not being conducted, but CTDEP issued an exemption letter stating that the unit did not require an air permit based on the projected maximum emissions. STATUS: According to the CTDEP, this exemption remains valid.

- No QA/QC plan for sampling had been submitted to EPA, QA/QC samples (i.e. duplicates, blanks) were not being collected, and information on sample holding times was not included in the data reviewed. EPA determined that since the two laboratories that analyzed NFTD's VOC samples are certified by the Connecticut DPH, the integrity of the sample analytical results is ensured. STATUS: While NFTD has not prepared and submitted a QA/QC plan to EPA, the objectives of a QA/QC plan are being met. The Regional Water Authority in New Haven, CT performs complete QA/QC on all

samples. The laboratory provides NFTD with sample containers, trip blanks, and any other materials required for quality control purposes (Spilletta, personal communication).

- According to NFTD, samples were being collected from before the stripper and prior to discharge to the public water supply, and not after the stripper, as specified in the AO. STATUS: NFTD continues to collect influent and effluent samples from sampling taps immediately before the stripper and final distribution to the public, respectively. Water samples are not collected after the stripper, but before chlorination, as specified in the AO. NFTD's sampling techniques are consistent with the requirements of the CTDPH.

- Samples were not collected in the distribution system during the first three months of the air stripper's operation, as was specified in the ROD and AO.

- The ROD and NFTD's Monitoring and Sampling Program specified yearly inspections of the air stripper, but Hydro Group's maintenance manual for the stripper does not specify an inspection interval. STATUS: As documented in the previous Five-Year Review Report, Hydro Group performed inspections of the air stripper every three years until 1997. According to NFTD, Hydro Group (now Layne Christensen) has not performed an inspection of the system since 1997. NFTD performs daily inspections and preventative maintenance checks, and has a relationship with Layne through which they will be contacted if operational issues are observed.

Since, at the time of the previous Five-Year Review, effluent from the air stripping unit had never exceeded MCLs, no major recommendations were made in the Five-Year Review Report. However, EPA recommended confirmation and labeling of the locations of the influent and effluent sampling taps located near the air-stripping tower so that NFTD can be assured that influent samples are being collected from the proper location. Since the last review, NFTD determined the locations of the influent and effluent taps through observation of the pressure at each sampling point, and confirmed that influent samples are being collected from the proper location.

6.0 FIVE-YEAR REVIEW PROCESS

This section provides a summary of the Five-Year Review process and the actions taken by EPA to complete the review.

6.1 Administrative Components

EPA, the lead agency for this five-year review, notified CTDEP and the RPs in early 2002 that the five-year review would be completed. EPA issued a scope of work, WAF No. 125-FRFE-0156, to TtNUS, under EPA RAC1 contract 68-W6-0045, on March 1, 2002 to assist EPA in performing the five-year review. The EPA Work Assignment Manager was Nancy Smith; support was provided by Terrence Connelly, the EPA Remedial Project Manager for the Kellogg-Deering Site. Graham Stevens of the CTDEP was part of the review team. The Draft Five-Year Review Report was sent to CTDEP for review on August 6, 2002. Comments were received from CTDEP on August 26, 2002 (see Appendix E).

The schedule established by USEPA included completion of the review by August 2002.

6.2 Community Notification and Involvement

EPA issued a press release on June 13, 2002 announcing EPA's review of the progress of the Kellogg-Deering Well Field Site cleanup. The press release encouraged public participation. There was a community group, the Waterforce, that was active in the mid-1980s but there has been little public involvement since that time.

During visits to the Norwalk City Hall and Norwalk Public Library on June 19, 2002, representatives from TtNUS briefly described the five-year review process to individuals in the Planning and Zoning Office and library's research department. According to the individuals interviewed, there has been limited interest in the Site. A complete Administrative Record for both OU1 and OU2 was available at the Norwalk Public Library. According to library staff the documents have not been used to any great extent.

6.3 Document Review

This five-year review consisted of a review of relevant documents including decision documents and monitoring reports, as specified in the EPA SOW for this review (See Appendix A).

6.4 Data Review

A review was completed of various RP-contractor monitoring reports and plans to assess contaminant levels and relevant trends that may be indicative of remedy performance. A summary of relevant data regarding the components of the Site remedy is presented below.

6.4.1 OU1—Kellogg-Deering Well Field

Quarterly performance monitoring VOC sample results were reviewed for the OU1 treatment system. Since 1997, only one influent sample has contained a concentration of any VOC exceeding its Maximum Contaminant Level (7.0 ppb TCE detected in May 1999). Generally, since 1997 influent concentrations of VOCs have been between non-detect and 3.0 ppb, with TCE concentrations of 1.8 ppb detected as recently as November 2001. No relevant upward or downward trends in influent VOC concentrations have been observed since 1997. Influent sampling data since 1997 for the most frequently detected VOCs are summarized in Table 6-1.

Effluent samples since 1997 have not contained chlorinated VOCs, whose presence was the basis for initial action at OU1, indicating that the air stripper continues to remove the contaminants of concern from groundwater prior to distribution. Several trihalomethanes (THMs), which are by-products of the chlorination or bromination process, have been detected in samples collected from the plant effluent at concentrations below the MCLs for Total THMs.

6.4.2 OU2—Source Remediation Area

Quarterly Groundwater Monitoring Reports and Quarterly ITS reports were reviewed for the source control and groundwater remedies for OU2. Analytical data from groundwater samples, groundwater treatment system influent and effluent samples, SVE system air samples, and soil samples were reviewed. Mass removal calculations for both remedies were also reviewed. The

TABLE 6-1
GROUNDWATER INFLUENT CONCENTRATIONS SINCE LAST FIVE-YEAR REVIEW OU1 TREATMENT SYSTEM
FIVE-YEAR REVIEW REPORT
KELLOGG-DEERING WELL FIELD SITE
NORWALK, CONNECTICUT

Sampling Date	PCE (ppb) [MCL = 5 ppb]	TCE (ppb) [MCL = 5 ppb]	Cis-1,2-DCE (ppb) [MCL = 70 ppb]
2/12/02	ND	1.6	1.7
11/7/01	0.6	1.8	ND
8/14/01	ND	1.0	ND
5/2/01	ND	1.1	ND
1/24/01	ND	ND	ND
11/15/00	ND	ND	ND
8/23/00	0.53	1.7	1.2
5/10/00	ND	1.3	ND
1/31/00	NA	NA	NA
11/17/99	1.1	3.7	ND
8/18/99	ND	ND	ND
5/12/99	2.0	7.0	ND
2/10/99	ND	ND	ND
12/10/98	ND	2.0	ND
8/24/98	ND	2.0	2.0
4/20/98	ND	ND	ND
2/17/98	ND	1.0	ND
11/24/97	ND	2.0	2.0
8/18/97	ND	3.0	3.0
5/12/97	ND	ND	ND
2/10/97	ND	ND	ND

Source:
Connecticut Department of Public Health and Norwalk First Taxing District water quality sampling historical data

following sections provide a description of relevant data trends observed between February 1994 (GZA, 1994) and June 2001 (GZA, 2001c).

6.4.2.1 Groundwater Analytical Data

Groundwater wells from which quarterly groundwater samples were collected between 1993 and 2001 are organized into three different groups in each of the Quarterly Groundwater Monitoring Reports and Quarterly ITS Monitoring Reports as follows:

- extraction wells utilized for the groundwater treatment,
- monitoring wells located within the Complex, and
- monitoring wells located within the SRA (between Main Avenue and the railroad tracks).

Table 6-2 presents a summary of average TCE concentrations detected in selected groundwater wells from each of the three well groups. TCE is the most prevalent COC in groundwater and has the highest concentrations. Only wells for which sampling data are available for every quarterly sampling round were used to calculate average concentrations (see table notes). It should be noted that the groundwater monitoring plan is designed so that only monitoring wells exhibiting relatively high concentrations of VOCs are sampled every quarter, therefore the average concentrations shown in Table 6-2 do not represent average concentrations of TCE in groundwater throughout the Site. Average concentrations were analyzed in an attempt to characterize general trends in VOC concentrations, and not to assess remedial progress. As discussed in Section 4.2.3, in 2002 the monitoring program was reduced to semi-annual events in the spring and fall of each year (see Table 4-4).

Concentration trends for TCE in groundwater samples were assumed to be representative of general trends for the other VOCs that are analyzed as part of the groundwater treatment system monitoring program. Since 1994, TCE concentrations in groundwater samples collected from extraction wells and selected wells located within the SRA have decreased noticeably. However, TCE concentrations in groundwater samples collected from selected monitoring wells located within the Complex have not significantly decreased, and in certain cases have increased over time (ML-6D).

TABLE 6-2
QUARTERLY AVERAGE TCE CONCENTRATIONS
FIVE-YEAR REVIEW REPORT
KELLOGG-DEERING WELL FIELD SITE
NORWALK, CONNECTICUT

Sampling Date	Complex Wells (ppb)	Extraction Wells (ppb)	SRA Wells (ppb)
12/1993	44,200	NA	12,248
3/1994	30,800	NA	15,750
6/1994	100,600	NA	51,825
9/1994	24,220	NA	20,575
12/1994	30,400	NA	27,750
3/1995	NA	NA	NA
6/1995	38,200	NA	26,425
12/1995	24,200	NA	17,950
3/1996	26,140	NA	17,250
6/1996	21,220	NA	11,400
9/1996	25,000	NA	13,925
12/1996	16,660	7,845	15,150
3/1997	15,700	9,463	17,800
6/1997	10,040	6,970	44,500
9/1997	17,840	9,993	29,025
12/1997	24,060	8,508	39,250
3/1998	13,740	7,313	7,150
6/1998	30,020	6,413	39,825
9/1998	15,920	6,993	49,200
12/1998	16,240	8,280	17,988
3/1999	17,700	6,722	19,550
6/1999	19,440	5,635	26,300
9/1999	27,500	4,702	32,100
12/1999	14,540	4,739	23,300
3/2000	23,700	5,522	14,625
6/2000	25,340	4,637	7,375
9/2000	17,040	3,847	13,970
12/2000	26,100	4,128	8,350
3/2001	30,640	4,046	7,550
6/2001	25,500	4,966	11,700

NOTES:
1. Source: GZA Quarterly Groundwater Monitoring Reports (February 1994-June 1997) and Quarterly ITS Monitoring Reports (September 1997-June 2001)
2. Complex wells: ML-6D, ML-7D, MW-3, MW-100, K-18B
3. Extraction wells: EW-2, EW-3, EW-4, EW-4OB, EW-5, EW-5OB, EW-6, EW-6OB, EW-7, EW-8, IW-1, IW-2, IW-3, and IW-4
4. SRA wells: ML-1D, ML-2D, ML-3D, ML-4M
5. NA: Data Not Available

The most recent groundwater analytical data reviewed (GZA, 2001c) indicate that seven of the ten contaminants for which cleanup standards were established in the ROD were not detected or were detected at concentrations below the established cleanup standard.

The three contaminants whose concentrations have not been reduced to their cleanup goals are TCE, PCE, and cis-1,2-DCE. A cleanup goal was established in the ROD for 4-methyl-2-pentanone (MiBK), but the groundwater monitoring program no longer analyzes for this contaminant since it was not detected in groundwater samples collected during the early sampling rounds.

In June 2001, the concentrations of TCE, PCE, and cis-1,2-DCE were orders of magnitude greater than cleanup goals established in the ROD. TCE concentrations within the treatment system extraction wells and in monitoring wells throughout the SRA were approximately 1,000 times cleanup goals, on average. PCE concentrations in groundwater samples collected from these wells were up to 200 times cleanup goals, and cis-1,2-DCE concentrations were up to 100 times cleanup goals. A summary of TCE, PCE, and cis-1,2-DCE concentrations detected in groundwater samples collected in June 2001 from treatment system extraction wells and monitoring wells located in the SRA is presented in Table 6-3. These extraction and monitoring wells are shown on Figure 4-3.

Based on the review of groundwater analytical data, the groundwater treatment system appears to be reducing concentrations of VOCs in groundwater in portions of the SRA. However, VOC concentrations within the boundaries of the Complex do not appear to be decreasing. A further discussion of issues that may be impacting the performance of the groundwater treatment system within the Complex is provided in Section 7.0.

6.4.2.2 Groundwater Treatment System Analytical Data

Treatment system samples are collected monthly from influent and effluent sampling ports within the ITS treatment building, and analyzed for VOCs. Influent TCE concentrations have decreased noticeably since 1997 (see Table 6-4), and since April 2000 the highest effluent concentration of TCE has been 1.4 ppb. Effluent concentrations of TCE exceeding the cleanup goal (5.0 ppb) were observed in effluent samples collected in June 1997, October 1997, December 1997, March 1998, February 2000, and March 2000.

TABLE 6-3
SUMMARY OF TCE, PCE, AND CIS-1,2-DCE CONCENTRATIONS IN GROUNDWATER
JUNE 2001
FIVE-YEAR REVIEW REPORT
KELLOGG-DEERING WELL FIELD SITE
NORWALK, CONNECTICUT

Well Number	TCE (ppb) MCL = 5 ppb	PCE (ppb) MCL = 5 ppb	cis-1,2-DCE (ppb) MCL = 70 ppb
IW-1	7800	150	3300
IW-2	3500	190	420
IW-3	14000	1000	7200
IW-4	2000	85	850
EW-2	600	<10	490
EW-3	110	<5.0	80
EW-4	1900	<100	340
EW-4OB	4100	150	1700
EW-5	23	1	23
EW-5OB	10	<1.0	1.8
EW-6	6900	250	3500
EW-6OB	4100	100	1600
EW-7	480	13	17
EW-8	24000	850	440
ML-6S	150	<10	12
ML-6D	74000	250	35000
ML-7D	29000	1000	3100
MW-3	5800	98	190
MW-100	14000	250	1600
K-18B	4700	110	69
K-19B	1800	130	23
ML-1D	1500	10	160
ML-2D	12000	<100	15000
ML-3S	7	<1.0	5.6
ML-3D	2300	<25	3200
ML-4M	31000	170	750
ML-4D	260	<50	6300
ML-8M	100	<1.0	10
ML-9	5	<1.0	<1.0
ML-10	24	<1.0	5.9
ML-11	9.5	<1.0	<1.0
ML-12S	4.2	<1.0	63
ML-12M	100	<25	230
ML-12D	1.7	<1.0	110
ML-13S	11	<1.0	13
ML-13M	31	<1.0	83
ML-13D	13	<2.0	420
ML-14S	1.2	<1.0	<1.0
ML-14M	330	<5.0	1200
ML-14D	1500	<10	2000

SOURCE: GZA, 2001c

TABLE 6-4
SUMMARY OF GROUNDWATER TREATMENT SYSTEM INFLUENT AND EFFLUENT SAMPLING
FIVE-YEAR REVIEW REPORT
KELLOGG-DEERING WELL FIELD SITE
NORWALK, CONNECTICUT

Date	TCE (ppb)		PCE (ppb)		cis-1,2-DCE (ppb)	
	influent	effluent	influent	effluent	influent	effluent
Jan-97	4100	3.2	150	ND	1000	7.1
Feb-97	3600	4.2	170	ND	900	3.5
Mar-97	3500	3.2	110	ND	850	2.2
Apr-97	1600	2.1	64	ND	620	1.1
May-97	2400	5	ND	ND	670	1.5
Jun-97	7500	5.7	240	ND	1500	3.9
Jul-97	4500	1.4	150	ND	1200	1.8
Aug-97	7900	1.8	310	ND	1300	1
Sep-97	8700	1.5	290	ND	1200	ND
Oct-97	6200	6.8	320	ND	1000	3.3
Nov-97	2000	4.9	130	ND	710	2.8
Dec-97	12000	8.2	410	ND	2500	5.7
Jan-98	6800	1.7	150	ND	1300	5.7
Feb-98	4800	ND	210	ND	2800	ND
Mar-98	5000	9.9	310	ND	1400	2.1
Apr-98	NA	NA	NA	NA	NA	NA
May-98	3100	ND	ND	ND	720	ND
Jun-98	3400	2.9	ND	ND	760	ND
Jul-98	2800	ND	ND	ND	580	ND
Aug-98	5300	1.1	ND	ND	1900	ND
Sep-98	5300	1.1	ND	ND	1200	ND
Oct-98	4500	3.6	150	ND	860	2.4
Nov-98	4100	1.7	100	ND	790	1.2
Dec-98	5000	1.5	290	ND	1100	ND
Jan-99	3600	1.1	100	ND	610	ND
Feb-99	2700	2.2	79	ND	510	1.3
Mar-99	2400	1.4	130	ND	440	1.2
Apr-99	1900	ND	ND	ND	370	ND
May-99	1400	1	ND	ND	310	ND
Jun-99	5700	3	130	ND	1100	ND
Jul-99	2600	4	ND	ND	660	ND
Aug-99	3700	ND	65	ND	740	ND
Sep-99	3500	2	95	ND	690	1.6
Oct-99	2400	1.6	69	ND	370	1.2
Nov-99	3700	2.6	91	ND	300	1.7
Dec-99	4600	4	100	ND	330	1.1

TABLE 6-4 (cont.)
SUMMARY OF GROUNDWATER TREATMENT SYSTEM INFLUENT AND EFFLUENT SAMPLING
FIVE-YEAR REVIEW REPORT
KELLOGG-DEERING WELL FIELD SITE
NORWALK, CONNECTICUT

Date	TCE (ppb)		PCE (ppb)		cis-1,2-DCE (ppb)	
	influent	effluent	influent	effluent	influent	effluent
Jan-00	2600	4.6	ND	ND	420	2.3
Feb-00	2200	9.9	110	ND	790	13
Mar-00	1300	5.1	48	ND	480	2.2
Apr-00	1200	1.3	26	ND	310	1.1
May-00	1500	ND	29	ND	360	ND
Jun-00	1200	ND	41	ND	320	ND
Jul-00	1100	ND	31	ND	300	ND
Aug-00	1100	ND	34	ND	290	ND
Sep-00	1500	ND	28	ND	340	ND
Oct-00	2800	ND	79	ND	700	ND
Nov-00	1000	ND	38	ND	320	ND
Dec-00	1900	ND	61	ND	520	1.4
Jan-01	1300	1.4	ND	ND	330	ND
Feb-01	1300	ND	32	ND	310	ND
Mar-01	2500	1.3	150	ND	440	ND
Apr-01	930	ND	26	ND	250	ND
May-01	1300	ND	32	ND	230	ND
Jun-01	1100	ND	37	ND	300	ND

NOTES:
Source: GZA Quarterly Groundwater Monitoring and Quarterly ITS Monitoring Reports
ND: Contaminant not detected above minimum detection limit
NA: Data not available

Influent concentrations of PCE and total 1,2-DCE have also decreased over time. PCE has never been detected in an effluent sample. Cis-1,2-DCE has been detected in an effluent sample only once (December 2000) since May 2000. Occasional detections of other VOCs (1,1-DCA, dichloromethane, chloroform) were observed in effluent samples at concentrations below their MCLs. Vinyl chloride was detected in an effluent sample collected in October 1999 at 2.8 ppb, above its MCL of 2.0 ppb.

Based on the review of groundwater treatment system analytical data, the groundwater treatment system appears to be effectively removing VOC contamination from extraction wells at OU2. Influent concentrations of VOCs are decreasing and effluent samples indicate that treated water that is discharged to the storm sewer routinely meets discharge limits with the exception of the 6 TCE exceedances mentioned above.

6.4.2.3 SVE System Air Sample Analysis

The ITS monitoring program for the SVE portion of the remedy includes monthly and semi-annual monitoring activities. During normal operation of the SVE system, monthly activities included the collection of air samples from six influent sampling locations and one effluent sampling location. Semi-annual monitoring activities included the collection and analysis of soil-gas samples from several extraction and monitoring points throughout the Complex. All samples are analyzed for VOCs using a portable gas chromatograph.

Total VOC concentrations detected in monthly influent air samples have decreased considerably since 1997, from a maximum of 40.4 ppm/v (Matheis Court, October 1997) to 0.85 ppm/v (total SVE system) in February 2001, the most recent sampling event. VOCs were not detected in the effluent air sample collected in February 2001, and have been below 1.0 ppm/v since 1997 except for two monthly sampling events (2.4 ppm/v in April 2000 and 3.8 ppm/v in January 1999) (GZA, 2000b, GZA, 1999).

Semi-annual system monitoring between January 1998 and January 2001 revealed mixed results for VOC concentrations in soil-gas samples collected from wells located within the Complex. Concentrations of VOCs in soil-gas samples collected from the Zell 1 and Zell 2 wells were zero in January 2001. Concentrations of VOCs in soil-gas samples collected from the Matheis Court and Zell/Zell Courtyard wells have decreased considerably since 1998 and were

at or near zero in January 2001, although a slight increase was observed from the January 2000 monitoring event. A similar pattern was observed in soil-gas samples collected from the Elinco wells, where VOC concentrations approached zero in January 2000, but rebounded to near January 1998 levels during the January 2001 monitoring event. Concentrations of total VOCs in the Zell/Elinco Corridor wells have generally decreased slightly, with one notable exception (ZE-4d contained 533.90 ppm/v total VOCs in January 2001).

Review of performance and monitoring sampling data for the SVE system indicates that a considerable reduction in VOCs within the vadose zone has occurred since system startup. However, the detection of high concentrations of VOCs in soil-vapor samples collected from certain portions of the Site indicates that VOC contamination in soils still exists. A discussion of potential additional actions that may be taken to address residual soil contamination is presented in Section 7.0.

6.4.2.4 VOC Mass Removal

VOC mass removal calculations are performed quarterly to estimate the quarterly and cumulative VOC mass removal by the ITS. Groundwater VOC mass removal rates for individual wells are calculated using total VOC concentrations collected during quarterly sampling events (Section 6.4.2.1) and average groundwater extraction rates collected during the operation of the ITS. Individual well VOC removals are then totaled to estimate the total VOC removal for the groundwater treatment system. Table 6-5 provides a summary of quarterly VOC mass removal for the groundwater treatment system since 1997. Mass removal rates have decreased considerably since 1997, but significant mass removal is still occurring.

VOC mass removal rates for soil are calculated using SVE influent VOC concentrations (Section 6.4.2.3) and SVE system flowrate measurements recorded by the ITS control system. As shown in Table 6-5, quarterly mass removal rates from the SVE system have decreased significantly since 1997, but have not reached zero. A further discussion of the performance of the SVE system is provided in Section 7.0.

TABLE 6-5
VOC MASS REMOVAL CALCULATIONS
FIVE-YEAR REVIEW REPORT
KELLOGG-DEERING WELL FIELD SITE
NORWALK, CONNECTICUT

Date	Estimated VOC Mass Removed from Groundwater (pounds)	Estimated VOC Mass Removed from Soil (pounds)
July-December 1996	380	360
January-March 1997	530	30
April-June 1997	490	25
July-September 1997	480	30
October-December 1997	420	34
January-March 1998	250	14
April-June 1998	130	trace
July-September 1998	360	trace
October-December 1998	280	trace
January-March 1999	150	trace
April-June 1999	320	trace
July-September 1999[1]	100	trace
October-December 1999	230	trace
January-March 2000	140	trace
April-June 2000	110	trace
July-September 2000[2]	80	trace
October-December 2000	160	trace
January-March 2001	70	trace
April-June 2001	110	trace
TOTAL REMOVED:	**4,790**	**493**

Source: GZA Quarterly ITS Monitoring Reports (1997-2001)

[1] SVE system operation schedule switched to monthly cycling in August 1999

[2] SVE system operation schedule changed to six months off/one-plus day on in August 2000

6.4.2.5 Pre-Screening Soil Sampling Results

In November 1998, a pre-screening soil sampling and analysis program was conducted to quantify residual VOC concentrations in certain areas of the SVE network and evaluate areas where elevated VOC soil gas concentrations had been observed during semi-annual SVE system monitoring activities (Section 6.4.2.3). Subsurface soil samples were collected from 2 to 6 feet bgs within 5 to 10 feet of extraction or monitoring points from which elevated concentrations of VOCs had been observed. The results of the pre-screening soil sampling indicated that the cleanup standards established in the ROD had not been achieved for TCE, PCE, and vinyl chloride (GZA, 1999). Soil sampling results are presented on Table 6-6.

In October 1999 a second soil sampling event was conducted to assess remedial progress and evaluate the impact of sample preservation methods on the remedial progress assessment. Subsurface soil samples were collected from nine soil boring locations using four different sample collection and analysis methods (EPA Methods 1312, 5030, and 5035 for low and high concentrations). Soil samples analyzed using EPA Method 5030 indicated that, except for three samples, VOC concentrations were below cleanup standards. Soil samples analyzed using EPA Method 1312 (SPLP) showed that all but one sample contained VOC concentrations below the cleanup threshold for leachate. However, soil samples analyzed using EPA Method 5035 indicated that 7 of 9 samples contained VOC concentrations exceeding cleanup standards (GZA, 2000e). Table 6-6 provides a summary of soil analytical results. A further discussion of soil sampling results is presented in Section 7.0.

6.4.3 OU3—Downgradient Area

Annual sampling and analysis of groundwater from wells located in OU3 has been performed by the RP's contractor during the operation and maintenance of the OU2 remedy. During the most recent sampling round (December 2000) TCE, PCE, 1,2-DCE (cis and trans), and vinyl chloride were all detected in groundwater samples. Concentrations of TCE, cis-1,2-DCE, and vinyl chloride in groundwater samples collected from OU3 exceeded MCLs. TCE concentrations detected in groundwater samples collected from wells in the Downgradient Area are presented on Table 6-7.

TABLE 6-6
SUMMARY OF SVE SYSTEM PRE-SCREENING SOIL ANALYTICAL RESULTS
FIVE-YEAR REVIEW REPORT
KELLOGG-DEERING WELL FIELD SITE
NORWALK, CONNECTICUT

November 1998 Soil Sampling Results

Cleanup Zone	Zone 1								Zone 2	
Sample Location	GP-1	GP-3	GP-3	GP-4	GP-6	GP-7	GP-8	GP-9	GP-10	GP11
Sample Depth (ft bgs)	2.0-3.5	0.0-2.0	2.0-3.5	0.0-2.0	4.0-6.0	0.0-2.0	2.0-3.0	2.0-3.8	2.0-3.5	4.0-5.0
vinyl chloride	**130**	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-DCE	ND	**11,000**	830	69	ND	120	51	ND	ND	ND
TCE	ND	110	**840**	**5,100**	42	**2,200**	**2,400**	160	**2,300**	**180**
PCE	**510**	**12,000**	**23,000**	**1,100**	31	150	250	ND	**1,200**	48

October 1999 Soil Sampling Results

Cleanup Zone	Zone 1								Zone 2
Sample Location	ZZ-4A	ZZ-5A	ZZ-2MA	Z-103A	Z-101A	Z-203A	Z-E7A	Z-E4MA	MC-1A
vinyl chloride			**220**						
cis-1,2-DCE				<55	<60			<64	
TCE		82	<64	**180**	**190**	**2,300**	<56	80	**1,300**
PCE	**1,100,000**	**580**	130	<83	<90		<84	<96	130

NOTES:
Source: GZA, 1996a, GZA, 2000e
All concentrations reported in parts per billion (ppb)
Soil samples analyzed for VOCs via EPA Method 5035
Concentrations exceeding Cleanup Standards appear in **Bold Face** type
Soil samples were collected from the following areas:
Zell Courtyard: GP-1, GP-2, GP-3, ZZ-4A, ZZ-5A, ZZ-2MA
Zell 1: GP-4, GP-5, Z-101A, Z-103A
Zell 2: Z-203A
Zell/Elinco Corridor: GP-6, GP-7, GP-8, GP-9, ZE-7A, ZE-4MA
Matheis Court: GP-10, GP-11, MC-1A

Soil Cleanup Standards (ppb)

	Zone 1	Zone 2
vinyl chloride	38	32
cis-1,2-DCE	1200	1000
TCE	180	160
PCE	460	420

TABLE 6-7
TCE CONCENTRATIONS IN GROUNDWATER IN DOWNGRADIENT AREA (OU3)
FIVE-YEAR REVIEW REPORT
KELLOGG-DEERING WELL FIELD SITE
NORWALK, CONNECTICUT

Monitoring Well No.	TCE (ppb) 12/1993	TCE (ppb) 12/1994	TCE (ppb) 12/1995	TCE (ppb) 12/1996	TCE (ppb) 12/1997	TCE (ppb) 3/1999	TCE (ppb) 12/1999	TCE (ppb) 12/2000
K-6A	1.4	8	80	46	96	10	18	63
K-6B	410	290	210	76	220	200	160	100
K-9B	220	24	110	720	430	210	130	88
K-21	5,600	8,400	6,200	1,500	2800	2800	2100	1,800
K-22A	NA	NA	3.1	0.84	3.7	1.7	NA	1.9
K-22B	NA	NA	0.76	0.25	NA	NA	2.4	NA
K-24	3,900	5.2	5.8	79	100	25	NS	44

NOTES:
Source: GZA Quarterly Groundwater Monitoring Reports and Quarterly ITS Monitoring Reports
Groundwater samples analyzed by EPA Method 8260
NA = Not Available
TCE MCL = 5 ppb

Review of this data suggests that VOC concentrations in groundwater in the Downgradient Area are decreasing through natural attenuation, but are still significantly higher than MCLs. The highest TCE concentrations in OU3 were detected in a groundwater sample collected from monitoring well K-21, which is notable because of a bedrock fracture that was identified during installation of this well that was determined to provide a conduit for the flow of groundwater through bedrock (see Section 3.1.3). The presence of elevated concentrations of TCE at this location may indicate that this bedrock fracture is part of a network of fractures that provides a preferential groundwater migration pathway that is transporting contaminated groundwater from the upgradient source (the Complex) to OU3. A reevaluation of the remedy's ability to maintain hydraulic control over the groundwater contaminant plume would need to be conducted in order to support this hypothesis.

The installation of groundwater wells and use of groundwater is prohibited in this area by state and local health departments. A further discussion of potential future actions to address VOC contamination in groundwater at OU3 is presented in Section 7.0.

6.5 Site Inspection

A site inspection was conducted on June 18 and 19, 2002 with representatives from EPA, CTDEP, and EPA's contractor. The inspection of the Source Remediation Area, OU2, was completed on June 18, and was directed by representatives from the RP's contractor. The inspection of the Well Field, OU1, was completed on June 19, 2002 following a meeting at the offices of the NFTD. The inspection of the Well Field was directed by representatives of the NFTD. Both inspections included a site walkover, inspection of treatment facilities, and for OU2, a perimeter walk around the SRA to observe locations of groundwater extraction and monitoring wells. Both operable units were secured by chain-link fencing with locked gates. A site inspection report, including photographs, is included in Appendix B.

There were For Sale signs on the Zell buildings. There have been no reports of vandalism at the Complex; the treatment plant is equipped with security and fire alarm systems. The RP contractor reported that alarms have only been triggered by power outages. The Zell 1, Zell 2 and Elinco buildings are unoccupied and empty. The interiors of Zell 1 and Zell 2 are in very poor condition; the Elinco building was not entered. The treatment systems are checked by the RP's contractor on a monthly basis.

All equipment and instrumentation is wired to a central programmable logic controller within the treatment building.

The Complex is surrounded predominately by commercial businesses. There are a few private homes interspersed along Main Avenue. An assisted living facility is located just north of the Complex. All of the SRA wells were flush with the pavement and protected by either road boxes or manhole covers.

After concluding the inspection of the Complex, EPA and EPA contractor representatives drove around the Downgradient Area. This area is primarily residential, with an industrial park off Muller Avenue. There is a cemetery and commercial businesses along Broad Street.

During the inspection of the well field none of the production wells were pumping. Layne 2 was being redeveloped. NFTD representatives described the treatment system and indicated the locations where groundwater samples are collected, before and after the air stripper. NFTD's staff reported that minor vandalism has occurred in the well field. Water quality sample collection methods and coordination with the Regional Water Authority was discussed. While the NFTD does not have a QA Plan as required under the AO, the samples collected meet standard QA/QC requirements based on procedures followed by the NFTD as directed by the Regional Water Authority laboratory.

6.6 Interviews

General discussions and observations were documented during the site inspection on June 18, 2002 (OU2) and June 19, 2002 (OU1). Telephone interviews were completed as a follow up to the site inspection. The list of individuals interviewed regarding this five-year review is shown in Appendix C.

Sara Ramsbottom, CTDPH, commented on Well Field issues during a meeting on June 18, 2002 at the CTDEP offices. As a supplier of public drinking water, the NFTD must comply with CTDPH requirements for water testing and inspections. The NFTD reports all water quality testing results to the CTDPH, including samples collected prior to the air stripper and post-treatment, before the distribution system. CTDPH does not require a sample of the effluent

from the air stripper, prior to further treatment as stated in the AO. The CTDPH inspects the entire NFTD system every three years, focusing on the water treatment and distribution components. While pre- and post-air stripper data are reviewed, the inspection does not specifically evaluate the air stripper. The most recent inspection was in the Fall of 2001. Ms. Ramsbottom commented that the remedy is functioning well since no contaminants are being detected in the air stripper effluent samples. She did acknowledge the presence of THMs in the samples, but indicated that as by-products of the chlorination process, they were not an issue with regard to OU1.

George Fulton, NFTD, stated that the air stripper operates very effectively and is beneficial as well in the water treatment process by raising the pH. The operation of the air stripper is more cost effective and safer than the alternative (use of caustic) for pH control. Mr. Fulton and other representatives of the NFTD confirmed that routine maintenance is performed and water samples are collected at the frequency and according to procedures required by the CTDPH. While the NFTD appeared unaware of the requirements of the AO or the need to communicate with EPA or CTDEP, the remedy is being successfully implemented and properly maintained.

Terry Spilletta of the Regional Water Authority, New Haven, Connecticut, confirmed that the NFTD water samples are collected and analyzed in accordance with standard QA/QC procedures. The Authority provides the NFTD with sample collection containers and other materials, including trip blanks.

During the site inspection of the Complex and SRA, individuals from nearby businesses inquired of the group's activities. The individuals indicated no problems or issues with regard to the operation of the treatment systems for OU2. In 1997 when EPA issued the ESD, Jim Murphy, EPA Community Relations Coordinator, visited the area and met with City officials and local residents. He visited with residents in the Downgradient Area between the railroad and the Norwalk River and documented no concerns from the homeowners. The Norwalk City Clerk indicated that there was little interest in the Site; most City officials appeared to consider it a low-profile site. Visits to Norwalk City Hall and the Norwalk Public Library on June 19, 2002 confirmed that the Site continues to generate little interest or concerns from the public.

The CTDEP indicated that the OU2 NPDES discharge emergency authorization had expired. Graham Stevens investigated this issue and the permitting group at CTDEP is now working with

the RP contractor to bring the ITS storm sewer discharge into compliance with the current regulations. The ITS is adequately maintained. In response to initial complaints about noise from the system, the RP contractor added a silencer to the ITS.

There were no reported issues with access or institutional controls at either OU1 or OU2. The remedies at both operable units are functioning effectively with routine, appropriate maintenance.

Contacts were made with the air quality group and permits group of CTDEP to confirm regulatory changes mentioned by Graham Stevens. Rick Pirolli, Air Quality Group, confirmed that there had been a change to the air pollution control regulations (RCSA §22a-174-3a) earlier this year. The threshold for a permit to emit hazardous air pollutants was increased from 5 tons/year to 15 tons/year. Since OU1 operates under an air permit exemption and the estimated emissions from the ITS are in the lbs/year range, this regulatory change does not impact the permit status of either remedy.

Don Gonyea, Permitting Group, indicated that the emergency authorization for the NPDES discharge of treated groundwater from the ITS to the storm sewer had expired. He stated that the RP contractor has submitted an application for a new permit and that the ITS is in compliance with the "intent of the permit." The CTDEP will soon issue new general permit discharge regulations (CGS §22a-430b). Based on an assessment of the specifics of the discharge from the ITS (e.g. type of effluent, flow, discharge location, dilution of receiving waters) the ITS discharge may fall into the general permit category. If not, the CTDEP will issue an individual permit for the discharge to the storm sewer. Since the CTDEP is aware of the ITS discharge status and is working with the RP contractor on a permit revision, the system will be in full compliance with the new program once it is implemented and permits are issued.

7.0 TECHNICAL ASSESSMENT

This section provides a technical assessment of the remedies being implemented at each of the operable units at the Site, as outlined in the *Comprehensive Five-Year Review Guidance* (EPA, 2001).

7.1 OU1—Kellogg-Deering Well Field

7.1.1 Question A: Is The Remedy Functioning As Intended By The Decision Documents?

The review of documents, ARARs, site inspection notes, and quarterly water sampling results indicate that the remedy is functioning as intended by the ROD. The treatment system continues to operate as designed, and samples of groundwater collected immediately prior to discharge to the distribution system indicate that the air stripper is removing VOCs from the public water supply. As a result, the remedy is accomplishing the RAO established in the ROD to "assure a reliable supply of safe, potable water to the public dependent on the well field."

The operating procedures for the air stripper are adequate to maintain the effectiveness of the remedy. Daily inspections are performed on the air stripper, and Layne Christensen (the original installer of the air-stripping tower) is under agreement to repair any observed operational difficulties, should they arise. Quarterly water sampling is performed by NFTD at the influent to the air stripper and immediately prior to discharge to the distribution system. Norwalk Electric Motor Company changes out the blower motor yearly and inspects and maintains each motor before reinstallation. The treatment system is designed to stop pumping water through the air-stripping tower if the blower is not functioning correctly. There were no opportunities for system optimization identified during this review.

The operation and maintenance of the air-stripping tower at OU1 has become incorporated into NFTD's regular operations for the well field. Operations and maintenance costs for the air stripper are not separately tracked and recorded, but instead have become part of the NFTD operating budget. Information collected during the site inspection indicates that the treatment system is being operated and maintained efficiently, and no changes or improvements are recommended at the time of this five-year review.

Perimeter fencing controls access to the well field. As part of a GAA groundwater classification area, private wells are prohibited in the vicinity of the well field.

7.1.2 Question B: Are The Exposure Assumptions, Toxicity Data, Cleanup Levels, And Remedial Action Objectives (RAOs) Used At The Time Of The Remedy Selection Still Valid?

Changes in Standards and TBCs. Several new ARARs have been promulgated since the remedy selection, as has been documented in previous five-year review reports. Current chemical-specific ARARs that are applicable to OU1 include federal and state drinking water standards and state air emissions regulations.

Federal drinking water standards (MCLs) have not changed since the last five-year review. A summary of current drinking water standards and drinking water standards at the time of the last five-year review for the contaminants of concern is presented below in Table 7-1.

TABLE 7-1
CURRENT FEDERAL AND STATE DRINKING WATER STANDARDS
FIVE YEAR REVIEW REPORT
KELLOGG-DEERING WELL FIELD SITE
NORWALK, CONNECTICUT

Contaminant of Concern	USEPA MCLs (ppb)	CTDPH MCLs (ppb)
Trichloroethene	5	5
Tetrachloroethene	5	5
Cis-1,2-Dichloroethene	70	70
Trans-1,2-Dichloroethene	100	100
Methylene Chloride	5	------
1,1,1-Trichloroethane	200	200
Benzene	5	5
Xylenes	10,000	10,000

NOTES:
USEPA MCLs: United States Environmental Protection Agency Maximum Contaminant Levels
CTDPH MCLs: Connecticut Department of Public Health Code 19-13-B102

Since no changes have been made in federal or state MCLs, the protectiveness of the remedy is not affected.

CTDEP issued an exemption letter to NFTD in July 1988 stating that the District was not required to obtain an air emissions permit based on the projected maximum volatile chemical emissions from the air stripper. Influent concentrations detected from the treatment system have remained low, and an air permit is still not required.

Changes in Exposure Pathways. The primary routes of exposure to contamination identified in the ROD were through ingestion of drinking water and inhalation while showering. The estimated drinking water service area for the well field is 45,000 people and potential exposure routes have not changed. OU1 has been used as a drinking water source for portions of Norwalk since the mid-1960s.

No new contaminants or contaminant sources have been identified since the Supplemental RI/FS, which identified OU2 as the source of contamination to the well field. No toxic byproducts of the remedy were identified during the review.

Changes in Toxicity and Other Contaminant Characteristics. At the time of the ROD, benzene was the only contaminant of concern that was classified as a known human carcinogen. Both TCE and methylene chloride were classified as probable human carcinogens. Based on risk assessment procedures in use at the time of the RI, the incremental lifetime carcinogenic risk from groundwater at the well field was calculated as 1.8×10^{-4} for adults. This risk assessment was cited in the ROD as the primary justification of the need for remedial measures.

At present, benzene is still the only COC that is classified as a known human carcinogen. However, since the ROD the carcinogenic classification of several contaminants of concern has been revised. TCE was classified as a “Reasonable Anticipated to be Human Carcinogen” in 2000. PCE and methylene chloride were added to this list in 1989.

Changes in Risk Assessment Methods. Since the target cleanup levels for groundwater were based on MCLs, changes in risk assessment methods would be accounted for because MCLs use conservative default assumptions and are updated periodically.

Expected Progress Towards Meeting RAOs. Only one influent and no effluent concentrations of contaminants have exceeded federal and/or state drinking water standards since the last five-year review. Effluent concentrations of contaminants (from samples collected immediately prior to discharge to the distribution system) have never exceeded federal and/or state drinking water standards. Therefore, the primary RAO established in the ROD (to "assure a reliable supply of safe, potable water to the public dependent on the well field") has been and continues to be met.

7.1.3 Question C: Has Any Other Information Come To Light That Could Call Into Question The Protectiveness Of The Remedy?

No new information has become available that could impact the protectiveness of the remedy.

7.2 OU2—Source Remediation Area (SRA)

7.2.1 Question A: Is The Remedy Functioning As Intended By The Decision Documents?

Based on the review of the ROD, Consent Decree, EPA-approved remedial design plans, and historical sampling data, the remedy for OU2 appears to be functioning as intended. Operation and maintenance of the ITS has been performed as required by the O&M Plan (August 1995) and documented in quarterly reports. Information contained in these quarterly reports indicates that concentrations of VOCs detected in soil, soil-gas, and groundwater samples collected during O&M of the ITS have decreased considerably since system startup. Analysis of treatment system influent and effluent samples indicates that contaminants are being removed from soil and groundwater prior to the discharge of air and water to the environment. Mass removal calculations indicate that VOC mass reduction continues to occur via the treatment of contaminated soil and groundwater.

However, residual concentrations of VOCs in soil and groundwater at OU2 remain significantly above the cleanup standards that have been established for the remedy. Soil samples collected from OU2 during the Progress Assessment Plan (April 2000) to assess residual VOC contamination revealed that soils in the Zell/Zell Courtyard, beneath the Zell 1 and Zell 2 buildings, and beneath the Matheis Court building remain contaminated with concentrations of

VOCs above cleanup standards (GZA, 2000e). Groundwater samples collected in June 2001 as part of the regular O&M of the groundwater treatment system revealed concentrations of VOCs in groundwater throughout OU2 exceeding MCLs by several orders of magnitude. This information suggests that the remedy is functioning as intended for the short term, but the ability of the remedy to function as intended for the long term (i.e. achieve RAOs) is questionable.

The air emissions from the ITS contain negligible VOCs. The system's emissions remain well below the threshold for which a permit is required. The treated groundwater discharge to the storm sewer and associated monthly monitoring meet the intent of the NPDES emergency authorization. The RP contractor is working with CTDEP to obtain a new NPDES permit once the State's new permit program is in place. Solvent/condensate collected in drums during on-site carbon regeneration is properly manifested and periodically shipped to a hazardous waste recycling facility.

The annual O&M costs are running slightly higher than estimated in the O&M Plan. The estimated budget assumed that SVE monitoring would be complete after year 3. Since the SVE system continues to operate on an infrequent basis, the actual costs reflect this change.

Institutional controls on groundwater use, as required by the ROD and modified by the 1997 ESD, are in place. Access to the Complex is limited by perimeter fencing with locked gates and posted no trespassing signs.

7.2.2 Question B: Are The Exposure Assumptions, Toxicity Data, Cleanup Levels, And Remedial Action Objectives (RAOs) Used At The Time Of The Remedy Selection Still Valid?

Based on concentrations of VOCs detected in groundwater samples collected from OU2 in February 2001, and a comparison of these results to those obtained during previous groundwater sampling events, some of the RAOs established in the ROD may no longer be valid. One of the RAOs established in the ROD was to “restore the Source Area aquifer to drinking water quality”. While an obvious reduction in VOC concentrations has been observed in portions of OU2 since system startup, the current concentrations of VOCs in groundwater remain orders of magnitude above drinking water standards (MCLs). Additionally, the concentrations of TCE in groundwater samples collected from wells located in the Complex have been relatively stable (with occasional upward spikes) since 1996. The latter observation

seems to suggest that a continuing source of VOCs, possibly in the form of dense non-aqueous phase liquid (DNAPL), may be present in the source area. If this were found to be true, or if another previously unidentified source of contamination were found to exist in soils at the Complex, the cleanup levels and RAOs established in the ROD for groundwater would need to be reconsidered.

Soil cleanup standards were calculated during the pre-design phase of the remedial action, using a site-specific soil-water equilibrium partitioning model to determine the maximum allowable concentrations of VOCs in soil that could maintain contaminant levels in groundwater below MCLs. The model used site-specific data to simulate the movement of VOCs from soil to groundwater via the infiltration of water from the ground surface to the water table. Data collected during the pre-design investigation that was used to develop the model included the infiltration rate of water through the ground surface, lateral groundwater flow rate under the Site, organic carbon content of soil, and water content of soil at the Site. All of the assumptions and calculations made for the determination of these parameters remain valid.

However, if groundwater cleanup standards are determined to no longer be valid, then the assumption made in the equilibrium partitioning model that concentrations of VOCs in soil must be protective of groundwater subject to compliance with drinking water standards would no longer be valid. Therefore, soil cleanup standards would have to be recalculated or reconsidered as well in order to reflect the change in groundwater cleanup goals.

Since the signing of the ROD, Connecticut has promulgated the *Remediation Standard Regulations* (RSRs) for the purpose of regulating actions taken to remediate polluted soil, surface water, or groundwater at release areas within the State of Connecticut. The RSRs contain chemical-specific threshold concentrations of contaminants that are considered acceptable for certain land uses, groundwater classifications, and exposure scenarios. Soil criteria include Direct Exposure Criteria, which define concentrations of contaminants that are considered protective of human health if soils are subject to direct contact by users of the Site; and Pollutant Mobility Criteria, which define concentrations that are considered protective of groundwater quality in the vicinity of contaminated soil. Groundwater criteria include the Groundwater Protection Criteria, which are roughly equivalent to MCLs; Surface Water Protection Criteria, which are intended to assess potential impacts of contamination in groundwater that discharges to surface water bodies; and Volatilization Criteria, which define

concentrations of VOCs in groundwater that are considered to provide impacts to indoor air in buildings located above the contaminated area.

7.2.3 Question C: Has Any Other Information Come To Light That Could Call Into Question The Protectiveness Of The Remedy?

Concentrations of TCE, PCE, and cis-1,2-DCE in soil and groundwater samples collected at the Site indicate that the cleanup standards established in the ROD or in the Pre-Design Work Plan have not been met. Recent trends in VOC concentrations and mass removal rates seem to indicate that the ability of the remedy, as currently constituted, to achieve RAOs is questionable.

Similarly, groundwater samples collected from monitoring wells located in OU3 (as part of the O&M of the OU2 remedy) indicate that residual concentrations of VOCs detected in the Downgradient Area exceed MCLs for TCE, cis-1,2-DCE, and vinyl chloride. Institutional controls, in the form of statutory prohibitions on the use of groundwater in this area, are in place to protect residents from risks from the use or ingestion of groundwater in OU3.

7.3 Technical Assessment Summary

According to data reviewed, observations from the site inspections, and interviews, the OU1 and OU2 remedies are functioning as intended by the ROD for each operable unit. Each remedy is removing VOCs from contaminated media and discharging treatment system effluent that is protective of human health and the environment. Since the influent groundwater concentrations to the OU1 air stripper are routinely below MCLs, the OU1 remedy can be considered complete and a success.

Although the groundwater extraction system in OU2 continues to remove contaminant mass from the aquifer, groundwater monitoring results indicate VOC concentrations, while decreasing in most of OU2, are an order of magnitude higher than MCLs in many portions of the SRA. Additionally, groundwater concentrations in the Complex have not been significantly reduced by the operation of the groundwater extraction and treatment system, and remain orders of magnitude higher than MCLs. This may be indicative of the presence of DNAPL in OU2 that is contributing to sustained high VOC concentrations in the groundwater. If this is the case, remediation of groundwater to drinking water standards may not be technically practicable.

The SVE system, as designed, appears to have reached a limit to its effectiveness. However, hot spot areas of unsaturated zone contamination containing concentrations of VOCs above the current cleanup standards remain. The development of alternative cleanup standards may be appropriate. The Connecticut RSRs may be a useful means through which remedial progress may be assessed and achievable remedial goals may be developed so that progress can be made towards remedy completion.

There have not been changes to the ROD-specified ARARs that impact the OU2 remedy. However, the results of the O&M phase appear to indicate that the RAOs may need to be reevaluated. While protective in the short term, the OU2 remedy's long-term protectiveness is questionable.

There are no additional routes of exposure and restrictions on groundwater use are in place. Land use at the Site has not changed since the RODs were issued and is not expected to change.

8.0 ISSUES

This section provides a summary of the issues identified during the five-year review, a determination of whether these issues affect the current or future protectiveness of the remedy, and a short discussion of unresolved items that have been raised by EPA, CTDEP, and the RPs. Recommendations and follow-up actions are presented in Section 9.0.

8.1 OU1—Kellogg-Deering Well Field

No issues that affect the current and future protectiveness of the remedy for OU1 were identified during the five-year review process. Impacts to the well field from the upgradient source area are being managed adequately. Low concentrations of VOCs that are detected in influent samples from the treatment system are being removed from groundwater prior to distribution to the public water supply. Quarterly water quality testing procedures and preventative maintenance measures are in place to ensure that the remedy continues to be protective. The NFTD works closely with the CTDPH and has little involvement, or need for involvement, from either the EPA or CTDEP.

8.2 OU2—Source Remediation Area

The review of operations, maintenance, and performance monitoring data from Quarterly Groundwater Monitoring Reports and Quarterly ITS Monitoring Reports revealed that residual concentrations of VOCs in both soil and groundwater are above the cleanup standards established in the ROD. Furthermore, the analysis of historical and recent trends in VOC concentrations detected in groundwater samples collected from the Site seems to indicate that the remedy, as currently constituted, may not be capable of achieving the RAO to “restore the Source Area aquifer to drinking water quality”. Although influent and effluent treatment system samples verify that contaminants are being removed and the remedy is functioning as intended, residual concentrations of VOCs and VOC concentration trends indicate that the long-term effectiveness and future protectiveness of the remedy is in question.

Several unresolved items pertaining to the remedial progress of the SVE system exist at the time of this five-year review. In April 2000, the RP’s contractor submitted an SVE Progress Assessment Plan (PAP) intended to evaluate the progress of soil remediation at the Site and

support their contention that “the SVE system design objectives have been achieved across the majority of the targeted areas.” The SVE PAP documented the soil sampling and analyses that were completed to support this finding (GZA, 2000e).

The SVE PAP illustrated the discrepancies between remedial progress assessments that result from the use of EPA Method 5035 versus EPA Method 5030 to analyze soil samples for the presence of VOCs. Method 5035, which was adopted by EPA in June 1997 as a replacement for Method 5030, utilizes a closed purge and trap preparative procedure that results in total VOC concentrations greater than those reported through analysis via Method 5030. As a result, remedial progress assessments vary considerably depending upon which analytical method is used to measure VOC concentrations in soil samples collected from the Site. EPA and the RP’s contractor disagree over which analytical method is appropriate for current and future determinations of remedial progress and attainment of soil cleanup standards.

In August 1999, EPA agreed to modify the operation of the SVE system from full-time to cyclical operation on a monthly schedule while remedial progress assessment issues were being discussed, and in August 2000 the SVE operating schedule was further reduced to six months off, one-plus days on. Limited progress has been made toward a resolution of this dispute, and differences of opinion between the RP’s contractor and EPA persist.

The CTDEP has reviewed the draft Five-Year Review Report and in comments provided to EPA (see Appendix E) voiced concerns over three issues pertaining to the OU2 remedy:

- Indoor air quality – CTDEP reviewed the December 1992 “Indoor Air Monitoring Plan, Operable Unit 2” (GZA, 1992) and the results of the monitoring conducted pursuant to that plan. CTDEP observed that monitoring performed during the investigation indicated that TCE concentrations in indoor air at the Complex may exceed the Target Indoor Air Concentration of 5 $\mu g/m^3$ for TCE (RSR Appendix G, 1996). Based on this review, the CTDEP does not believe that the potential for migration of vapors, from both soil and groundwater polluted with VOCs, into Complex buildings or buildings in OU3 has been adequately evaluated.

- Effectiveness of the SVE system – the CTDEP believes that if the SVE system is not operating, then the remedy for OU2 is not protective. Specifically, under the current

operating schedule for the SVE system, they believe that the remedy does not achieve the objective of preventing the migration of contaminants into indoor air. In addition, CTDEP expressed concern that even if the SVE system, as designed, is operated on a meaningful basis it may not achieve the objective of preventing the migration of contaminants into indoor air.

- Protectiveness of the groundwater extraction system – the CTDEP reviewed groundwater monitoring results from monitoring wells in OU3 and found that VOC concentrations in groundwater close to the Norwalk River are several orders of magnitude higher than ambient surface water quality criteria adopted in the State's Water Quality Standards. The CTDEP believes that discharge of contaminated groundwater to the Norwalk River should be more thoroughly investigated.

8.3 OU3—Downgradient Area

Review of groundwater sampling data from select OU3 monitoring wells contained in Quarterly Groundwater Monitoring Reports and Quarterly ITS Monitoring Reports for OU2 revealed that concentrations of VOCs exceeding MCLs are present in groundwater in the Downgradient Area. Institutional controls, in the form of Connecticut statutory and regulatory restrictions on the installation of groundwater wells in this area, are in place to protect human health by preventing the ingestion of contaminated groundwater. These institutional controls appear to be effective since no evidence of groundwater use in OU3 was encountered during the five-year review process. Risks associated with the exposure to contaminants through the inhalation of VOC vapors that migrate from groundwater and accumulate in indoor air were not evaluated during this five-year review. As mentioned above, based on previous studies CTDEP does not believe that the potential for migration of vapors from groundwater polluted with VOCs into buildings in OU3 has been adequately evaluated.

In an ESD issued in 1997, EPA postponed selection of a remedy for OU3 due to the ongoing remedial activities at OU2 and the absence of an exposure pathway (due to institutional controls prohibiting the use of groundwater). EPA stated that further actions would not likely be needed and that the final remedial decision regarding the Downgradient Area would not be made until an evaluation of the success of the OU2 treatment system was performed. One of the factors cited by EPA that may result in an earlier reassessment of the need for a remedy at OU3 was

the existence of “any future data indicating that the contamination plume at the site is having a negative impact on the Norwalk River” (EPA, 1997). Elevated concentrations of TCE and vinyl chloride detected in monitoring wells K-6A and K-6B, which are located within 200 feet of the Norwalk River, may have the potential to negatively impact the River. Potential impacts on the river were not evaluated during this five-year review. As mentioned above, the CTDEP believes that the discharge of contaminated groundwater to the Norwalk River should be more thoroughly investigated.

Despite residual concentrations of VOCs that exceed drinking water standards in the Downgradient Area and elevated concentrations of VOCs detected in groundwater immediately upgradient of the Norwalk River, separate remedial activities for OU3 may not be necessary. Trends in VOC concentrations indicate that TCE concentrations in the Downgradient Area have generally decreased since quarterly monitoring of the OU2 groundwater treatment system (which included yearly sampling of selected monitoring wells in OU3) began in December 1993. This observation, along with the fact that concentrations of vinyl chloride in groundwater have increased since December 1993, seems to indicate that natural attenuation is occurring in the Downgradient Area and total VOC concentrations should continue to decrease over time. Time frames for natural attenuation of VOCs in groundwater were not assessed during the five-year review process.

9.0 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

The following is a summary of recommendations and follow-up actions that are proposed for each of the three operable units at the Site. Since the remedy was determined to be functioning as intended and no issues were identified that impacted its protectiveness, actions proposed for OU1 are intended to discontinue federal regulatory authority over the remedy. The actions recommended for OU2 and OU3 involve continuing efforts to enhance the success of the OU2 remedy and address residual contamination in OU3 that is not hydraulically controlled by the OU2 groundwater extraction system. Table 9-1 provides a summary of the recommendations presented in this Section.

9.1 OU1—Kellogg-Deering Well Field

As mentioned previously, the remedy for OU1 is functioning as intended by the decision documents, is achieving RAOs, and remains protective of human health and the environment. However, due to elevated concentrations of VOCs detected in groundwater samples collected from OU3 (which are not hydraulically contained by the OU2 groundwater extraction system), it is recommended that NFTD continue operation of the air stripper to protect against potential future migration of VOCs into the well field from the Downgradient Area.

The NFTD works closely with the CTDPH to ensure that groundwater delivered from the well field to the drinking water distribution system is protective of human health. Little involvement, or need for involvement, has been necessary from either the EPA or CTDEP. Consideration should be given to modifying the AO between NFTD and EPA to declare the remedy complete. This would allow the State of Connecticut, rather than EPA, to oversee the performance of the wellhead treatment system in place at OU1.

9.2 OU2—Source Remediation Area

The following is a summary of recommendations intended to enhance the success of the OU2 remedy and improve the long-term protectiveness of the remedy.

TABLE 9-1
SUMMARY OF RECOMMENDATIONS AND FOLLOW-UP ACTIONS
FIVE-YEAR REVIEW REPORT
KELLOGG-DEERING WELL FIELD SITE
NORWALK, CONNECTICUT

Issue	Recommendations/Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness? (Y/N)	
					Current	Future
OU1—Maintain Protectiveness of Remedy	Continued operation of air stripper. Modify AO so that wellhead treatment system oversight becomes responsibility of State.	EPA	State	September 2003	N	N
OU2—Technical Practicability of Achieving RAOs for GW	Reassessment of ability of remedy to achieve drinking water standards.	RPs	EPA/State	September 2003	N	Y
OU2—Soil Cleanup Standards	Reassess soil cleanup standards based on alternative groundwater cleanup standards.	EPA	State	June 2003	N	Y
OU2—Regulatory Framework	Evaluate the use of Connecticut RSRs as a framework for reassessing the soil and groundwater components of the OU2 remedy.	EPA	State	June 2003	N	Y
OU3—Elevated Residual VOC Concentrations in Groundwater	Evaluate the need for remedial actions in OU3.	EPA	State	September 2003	N	Y

RAOs for groundwater should be reevaluated to assess the technical practicability of restoring the aquifer to drinking water quality. The technical practicability assessment may involve a comprehensive review of historical VOC concentrations and concentrations trends in groundwater samples collected since implementation of the remedy. Additionally, further study to determine whether a previously unidentified source of VOC contamination (i.e. DNAPL) exists at the Complex may be appropriate. If achieving drinking water standards in the SRA is determined to be technically impracticable, modifications to the selected remedy may be necessary to ensure long term protectiveness of human health and the environment. A modification of the ROD may be necessary to change the RAO for groundwater that was established in 1989 to restore groundwater in the SRA to drinking water quality. The other RAOs established in the ROD would remain valid and groundwater remediation would be necessary to prevent further introduction of contaminated groundwater from the SRA into OU3, the Norwalk River, and the well field; as well as to reduce the mass of VOCs in groundwater at the SRA.

Soil cleanup standards, which were originally developed under the assumption that groundwater would be remediated to drinking water standards, may also be reconsidered if a technical impracticability decision is made for the RAO to achieve drinking water standards for groundwater. Any reconsideration of the soil cleanup standards should be consistent with anticipated future site use. The technical practicability of achieving the existing soil cleanup standards without modifying the existing SVE system should also be evaluated as part of the cleanup standard reassessment. If alternative cleanup standards are developed and the remedy, as constructed, is not adequate to achieve cleanup goals, then modification of the ITS may be necessary. EPA anticipated the need for modifications to the source control remedy in the SOW for OU2: “EPA will evaluate all phases of the response actions at the Site and will require the Settling Defendants to install and use additional unsaturated zone remediation equipment at any time during the response action if necessary to effectuate cleanup objectives as promptly as practicable” (EPA, 1990). Potential modifications to the source control remedy could include reconfiguration of the SVE system and/or excavation and off-site disposal of soil from VOC “hotspots”.

The recommendations for modification of the OU2 remedy, including the development of alternative groundwater and soil cleanup standards, could be conducted under the regulatory

framework of the Connecticut RSRs. The RSRs would provide a standard set of procedures that would allow for a flexible resolution to the current conflict over remedial progress, and provide a process through which a desirable endpoint for both parties may be reached (e.g., remedy protectiveness, compliance with promulgated environmental regulations, remedy completion, and eventual site redevelopment/reuse).

Many of the issues that are impacting the long-term protectiveness of the remedy may be addressed within the framework of the RSRs. Section 22a-133k-3(e) of the RSRs contains provisions for the determination of technical impracticability of groundwater remediation. The RSRs may also be used to address concerns expressed by CTDEP regarding indoor air quality. Section 22a-133k-3(c) of the RSRs contains volatilization criteria for groundwater polluted with VOCs. The RSRs also contain provisions for the development of site-specific, alternative cleanup standards if the chemical-specific threshold concentrations presented in Appendix A of the regulation are determined not to be achievable (RSR, 1996). In comments submitted by the CTDEP (Appendix E), the State supported the use of the RSRs as a framework for protectiveness of human health and the environment.

9.3 OU3—Downgradient Area

Elevated concentrations of VOCs detected in monitoring wells in the Downgradient Area and within 200 feet of the Norwalk River may be appropriate to trigger a reassessment of the need for remedial action in OU3. In the meantime, groundwater sampling at selected locations in the Downgradient Area should continue on at least an annual basis as part of the ongoing O&M for OU2.

CTDEP believes that a further investigation of shallow groundwater in OU3 is warranted to evaluate the risk of vapors migrating into buildings from groundwater polluted with VOCs and the risk associated with the discharge of contaminated groundwater to the Norwalk River.

10.0 PROTECTIVENESS STATEMENTS

The OU1 remedy for the Kellogg-Deering Well Field is protective of human health and the environment and exposure pathways that could result in unacceptable risks are being controlled via the wellhead treatment system.

The remedy at OU2 currently protects human health and the environment (i.e. in the short term) because exposure pathways that could result in unacceptable risks are being addressed through institutional controls that prevent direct contact with contaminated soil, inhalation of contaminated soil vapors, and use of contaminated site groundwater. Groundwater extraction and treatment and periodic SVE treatment continue to occur, but VOC mass removal does not appear to be adequate to achieve the cleanup standards that were established in the ROD. In order for the remedy to be protective in the long-term, a reevaluation of the RAO of restoring the Source Area aquifer to drinking water quality must be made, and soil and groundwater cleanup standards should be reconsidered. If necessary, modifications to the remedy should be made.

This possibility was suggested in the 1989 ROD and Proposed Plan: "…EPA would reevaluate the remedy if after an adequate period of performance of the remedy complete restoration of the aquifer is determined to be technically impracticable and that cleanup goals might be readjusted if chemical contaminant concentrations reach a constant value and are no longer being removed at significant levels" (EPA, 1989). In addition, EPA retained the right to amend the 1989 ROD or change the Source Area remedy, as allowed under CERCLA. At present, the remedy for OU2 is protective based on the factors noted above. Follow-up actions are necessary to address long-term protectiveness because the RAO to restore groundwater to drinking water quality in the SRA is not expected to be met. A reevaluation of the RAOs and further evaluation of other potential actions is recommended.

The remedy at OU3 currently protects human health and the environment because institutional controls are in place to prevent the use of contaminated groundwater. Despite elevated concentrations of VOCs in groundwater in OU3, continued remedial activities at OU2, including possible modifications to the SRA monitoring and remediation system, should protect human health and the environment in the Downgradient Area.

11.0 NEXT REVIEW

No additional five-year reviews for OU1 would likely be conducted if action is taken to place the NFTD's operation of the well field under the oversight of the State of Connecticut. A second five-year review for OU2 will be conducted in 2007. Based on EPA's assessment of the progress of the OU2 treatment system in reducing contaminant concentrations in the Downgradient Area and their determination of the need for remedial action, a final remedial decision on OU3 may be made prior to the second five-year review for OU2.

APPENDIX A

DOCUMENT REVIEW LIST/REFERENCES

DOCUMENTS REVIEWED/REFERENCES CITED

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APPENDIX B

SITE INSPECTION REPORT

Kellogg-Deering Well Field Site Inspection – June 18 - 19, 2002
Five Year Review, WA# 125-FRFE-0156

Attendees:

Nancy Smith – EPA WAM
Terry Connelly – EPA RPM
Graham Stevens - CTDEP, Environmental Analyst
Phoebe Call – TtNUS, EPA Contractor, Project Manager
Steve Vetere – TtNUS, EPA Contractor, Project Engineer

The Site Inspection was conducted over two days. An inspection of OU2 – The Zell/Elinco/Mathies Court Complex, was completed on June 18. Prior to the OU2 inspection, a meeting was held at the CTDEP offices in Hartford, CT to discuss the Site with Sara Ramsbottom, CTDPH, in addition to those listed above. A meeting with the Norwalk First Taxing District (NFTD) to discuss OU1, the Kellogg-Deering Well Field, was held on June 19 and was followed by an inspection of the well field. Observations made by the EPA contractor and other participants are noted below. Follow up interviews with site inspection participants will be made at a later date.

OU2 Inspection Field Notes:

The following representatives from GZA, the RP contractor, participated in the inspection, in addition to the individuals noted above:

Jim Clark, PE – Associate Principal
Al Ricciardelli – Senior Principal
Dave Rusczyk – Assistant Project Manager

The inspection commenced at approximately 1:00 PM and concluded approximately 4:00 PM. Weather was sunny and hot, temperature approximately 80 degrees. Site photographs taken during the Site inspection follow this report.

Terry Connelly summarized the five-year review process including the fact that this review includes both OU1 and OU2. He commented on the apparent lack of communication between GZA and the NFTD. Al Ricciardelli mentioned that other than speaking with people from the NFTD at a pre-construction public meeting in August 1995, there has been no interaction between the parties. There have been no discussions about routine issues between OU2 and OU1 with NFTD.

Al Ricciardelli clarified the relationships between the RPs and property owner. GZA has been contracted by the RPs, who were operators of the facilities at the Complex, but did not own the property. The property is now in receivership (CB Richard Ellis, a real estate firm, has For Sale signs on the Zell Building). Graham Stevens noted that the CT RSRs would be applicable to any property sale via the CT Property Transfer Act.

The Site is secured with chain-link fence and locked gates. There were no trespassing signs on the main gates.

The Zell 1, Zell 2, and Elinco buildings are unoccupied and empty. There is office space above the Mathies Court building. The Elinco building was used for various manufacturing operations until the late 1990s.

The original air stripper building, installed in the late 1980s under an Order from the State, is abandoned but still in place. The four extraction wells installed at that time were rerouted from that building to the new treatment building during the remedial construction activities in 1995.

Treated groundwater is discharged to a storm sewer under an NPDES permit exclusion, according to GZA. Data collected monthly to meet the NPDES exclusion requirements is included in the quarterly ITS reports.

A rolloff container, used for storage of monitoring equipment, is located near the treatment building.

All extraction wells are wired separately into the system. The wells are set to cycle on/off and average 35-55 gpm. EW7 is a high yielding well and was reported to provide about 50% of the flow to the plant.

All treatment units for the SVE and groundwater treatment processes are inside the building. There are two steam-regenerated carbon vessels.

During the infrequent periods when the SVE system is now operated, the manifold lines are checked with a PID to see if VOCs are still present in the air stream.

The systems are checked on a monthly O&M schedule; GZA is decreasing groundwater monitoring from quarterly to semi-annually. The major O&M issue has been pumps burning out.

There have been no reports of vandalism. The treatment building contains security and fire alarm systems. The only problems have been power outages, which trigger the alarms.

Due to noise complaints from the condominium owners immediately upgradient of the treatment building (uphill from the retaining wall and property fence line), GZA added a silencer.

There are predominately commercial businesses directly across Main Avenue from the Complex (shopping plaza, car wash, gas station, Dominos) with a few private homes interspersed. There is an assisted living facility just north of the Complex.

During remedial construction in 1995-1996 GZA encountered some interest from business owners. During the site inspection individuals from two businesses inquired about our activities. In general they expressed no concerns about the Complex.

The Zell 1 and Zell 2 buildings are in very poor condition, ceiling tiles are falling and water seeps in at many locations. The Elinco building was not entered.

After leaving the Complex, the EPA and EPA contractor representatives drove around the area, in particular to check out the small residential area off of Broad Street between the railroad tracks and Deering Pond. This area is considered the Downgradient Area, or OU3 as discussed in the 1989 ROD. The area north of Broad Street is a mix of single-family homes with an industrial park off Muller Avenue. It appeared that all homes had basements. South of Broad Street is St. Mary's cemetery and commercial businesses.

OU1 Inspection Field Notes:

In addition to the EPA and CTDEP site inspection team, the following representatives of the NFTD participated in a discussion at the NFTD offices, followed by an inspection of the well field:

Mike Elliott, Engineer
George Fulton
Franco Chieffalo, Distribution Manager
Susan Ferrand, Water Quality Manager

The meeting at the NFTD offices began at 9:00AM and ended approximately 11:00AM.

George Fulton noted that there had been no communication with the OU2 RPs or GZA; in fact the NFTD became aware of the OU2 ROD via notices in Norwalk newspapers. He did mention meeting some people from GZA once or twice.

The influent to the air stripper is very low. Mr. Fulton provided a data summary that indicated that the VOCs in the influent to the stripper have not exceeded MCLs since May 1995. He reported that the stripper has the additional benefit of increasing the pH from about 6.8 to 7.1 and using it for this purpose is preferable to the use of caustic.

There is clay below the river with the sand/gravel aquifer at about 90 feet bgs. Due to this geology, Mr. Fulton stated that there is no leakage from the river into the well field. The NFTD is the only system drawing water from the aquifer.

The stripper has a design capacity of 5 MGD; generally the system treats 3 MGD.

MTBE has not been detected in the groundwater; has been found in surface water.

The NFTD maintains the system, changes out the motors on an annual basis, and only contacts Hydro Group if there are non-routine issues. The stripper is inspected daily. The packing of the stripper has never been replaced. A new tray was added to the stripper in 1997.

2-3 years ago someone from CTDEP collected air samples, but the NFTD did not receive the data. Graham will check with the DEP's air group about this issue.

Layne 1 was abandoned many years ago due to manganese concentrations and replaced by Layne 1R in 1996.

As a public water system supplier (and as required by the Administrative Order), the NFTD conducts routine sampling of the wells and treated water before the distribution system. All data are reported to CTDPH, the data are not reported to the Norwalk Health Department. It was noted that EPA has not been receiving the data from the NFTD.

Following the meeting NFTD staff conducted a walkover and inspection of the well field. The weather was sunny and hot. The inspection was completed at approximately 12:30 PM.

Information on the construction of the wells, drilling logs, etc. was requested by Graham and Steve Vetere.

NFTD personnel confirmed that influent and effluent sampling taps are easily identified through observation of pressure in each tap.

None of the wells were pumping during the inspection. Layne-2 had been running earlier in the day but the clearwell was above normal levels.

Layne-1R was being redeveloped the day of the inspection.

After the air stripper, the groundwater is treated with chemicals before being mixed with the surface water and discharged to the distribution system. The required post-stripper treated groundwater samples are taken after chemical addition (data show THMs).

Sue Ferrand is responsible for taking all the required samples, which are analyzed by the Regional Water Authority in New Haven. The lab provides NFTD with sample vials, QA samples (trip blanks, etc.)

There has been minor vandalism reported at the well field. The entire area is fenced and secured with locked gates.

VISIT TO NORWALK CITY HALL

A clerk in the Planning and Zoning office provided land use zoning and FEMA flood insurance maps for review. The zoning classifications of the well field and Complex areas of the Site were confirmed (UZ and B2, respectively). The City land use ordinances are available on line, the reference was provided.

The clerk was aware of the location of the well field but indicated that there is little interest expressed by the public in the cleanup.

VISIT TO NORWALK PUBLIC LIBRARY

The complete Administrative Record for the Site was readily available in the reference department of the library. Documents were briefly reviewed and copies of pertinent sections of documents were made.

Library staff was aware of the Site and indicated that there has been little use of the documents by the public.

KELLOGG-DEERING OU2 SITE INSPECTION
PHOTOGRAPHIC RECORD

Photo No.: 1

Date: 6/18/02

Comments: At the site entrance gate along Main Avenue, looking east at the Zell/Elinco Corridor. Zell 1 Building on left, Elinco Building on right.

Photo No.: 2

Date: 6/18/02

Comments: Looking northeast at the Elinco Building from the west side of Main Avenue. Site entrance gate visible in front of parked cars.

KELLOGG-DEERING OU2 SITE INSPECTION
PHOTOGRAPHIC RECORD

Photo No.: 3

Date: 6/18/02

Comments: Looking west/northwest across Main Avenue from the Zell 1 Building.

Photo No.: 4

Date: 6/18/02

Comments: Looking west/southwest across Main Avenue from the Zell 1 Building.

KELLOGG-DEERING OU2 SITE INSPECTION
PHOTOGRAPHIC RECORD

Photo No.: 5

Date: 6/18/02

Comments: SVE system piping in ceiling inside Zell 1 Building.

Photo No.: 6

Date: 6/18/02

Comments: SVE system extraction point in basement of Matheis Court Office Building. Flow meter and sample port visible.

KELLOGG-DEERING OU2 SITE INSPECTION
PHOTOGRAPHIC RECORD

Photo No.: 7

Date: 6/18/02

Comments: SVE system manifold piping inside of ITS building.

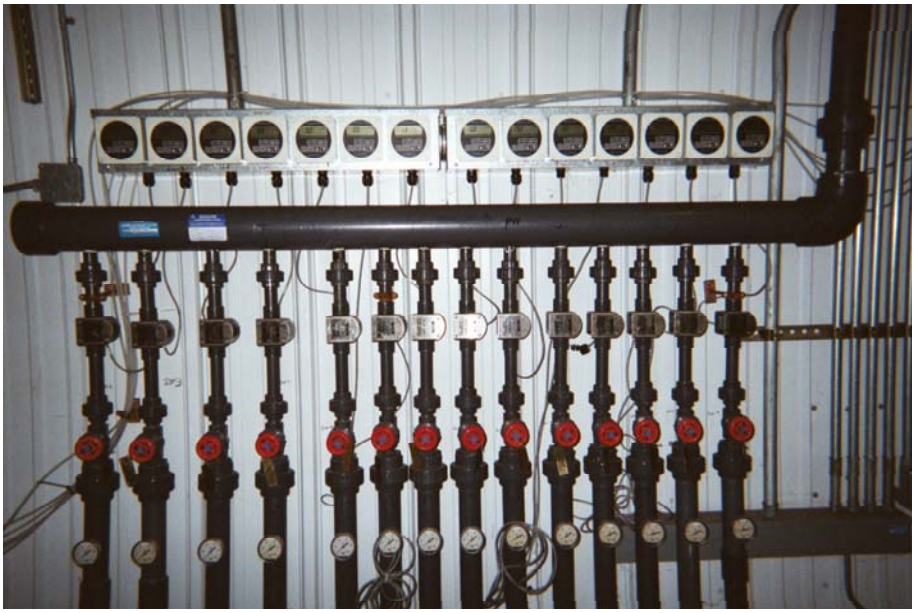

Photo No.: 8

Date: 6/18/02

Comments: Groundwater treatment system manifold piping from inside treatment building. Flow meters and sample ports visible.

APPENDIX C

SITE INTERVIEW LIST

INDIVIDUALS INTERVIEWED FOR THE KELLOGG-DEERING FIVE-YEAR REVIEW

Name/Position	Organization/Location	Date*
Franco Chieffalo	Norwalk First Taxing District/Norwalk, CT	June 19, 2002
Mike Elliott	Norwalk First Taxing District/Norwalk, CT	June 19, 2002 July 22, 2002
Susan Ferrand	Norwalk First Taxing District/Norwalk, CT	June 19, 2002
George Fulton	Norwalk First Taxing District/Norwalk, CT	June 19, 2002
Jim Murphy/ Community Relations	USEPA/Boston, MA	July 1, 2002 July 10, 2002
Sara Ramsbottom/ Sanitary Engineer	Connecticut Department of Public Health/ Hartford, CT	June 18, 2002 July 17&24,2002
Terry Spilletta	Regional Water Authority/New Haven, CT	July 11, 2002
Graham Stevens/ Environmental Analyst	Connecticut Department of Environmental Protection/Hartford, CT	June 18-19, 2002 July 16, 2002
Leslie McVickar/ former KD RPM	USEPA/Boston, MA	July 17, 2002
Don Gonyea/ Permitting	Connecticut Department of Environmental Protection/Hartford, CT	July 25, 2002
Rick Pirolli/Air Quality	Connecticut Department of Environmental Protection/Hartford, CT	July 25, 2002
William Frost/ KDSSPG	Edo Corporation/New York	July 29, 2002

* June 18 – 19, 2002 interviews were conducted during the site inspection; all other interviews were conducted via telephone.

APPENDIX D

ARARS AND TBCS

IDENTIFICATION OF ARARS AND TO-BE-CONSIDERED CRITERIA, ADVISORIES, AND GUIDANCE

REQUIREMENT/GUIDANCE	STATUS	REQUIREMENT/GUIDANCE SYNOPSIS
OPERABLE UNIT 1		
No ARARs are specified in the ROD. Relevant Federal criteria, advisories and guidance and State standards include:		
Federal Criteria, Advisories and Guidance		
• National Drinking Water Advisory Council (NDWAC) recommendations		
• Proposed Maximum Contaminant Level (PMCL), Recommended MCL (RMCL) and Proposed-Recommended MCL (PRMCL)		
• Suggested Adjusted Acceptable Daily Intake (AADI)		
Connecticut Standards		
• Connecticut Air Hazard Limited Values		
• Connecticut Drinking Water Regulations		
OPERABLE UNIT 2		
Federal Regulatory Requirements and Guidance		
Safe Drinking Water Act regulations establishing MCLs (40 CFR 141.11-141.16)	Relevant and Appropriate	Establish contaminant concentration levels in public drinking water. MCLs are the target cleanup levels for groundwater at the source area. Attaining the soil cleanup goals will ensure that any future migration of residual contaminants in the soil will not exceed MCLs in the source area.
Clean Water Act, National Pollutant Discharge and Elimination System (40 CFR 122-125)	Applicable	Discharges from the treatment systems to surface water will be in compliance with the Clean Water Act.
RCRA General Facility, Preparedness and Prevention, Contingency Plan and Emergency Procedure Requirements (40 CFR 264, misc.)	Applicable	Operations will comply with periodic monitoring, inspections, site security, spill control, and maintenance requirements. Contingency plans will be in place.
RCRA Container Requirements (40 CFR 264, Subpart I)	Applicable	Packing and accumlation of waste materials will comply with these requirements for use and management of containers.
RCRA Manifesting, Recordkeeping, and Reporting (40 CFR 264.70-264.77)	Applicable	Recordkeeping and manifesting of recovered waste TCE will comply with these requirements.
U.S. Department of Transportation Rules for Transportation of Hazardous Materials (49 CFR Parts 107, 171.1-171.500)	Applicable	Requirements for manifests and transportation of hazardous wastes off site will follow these standards.

IDENTIFICATION OF ARARS AND TO-BE-CONSIDERED CRITERIA, ADVISORIES, AND GUIDANCE (CONTINUED)

OPERABLE UNIT 2 (cont.)		
State of Connecticut Regulatory Requirements and Guidance		
Connecticut Water Quality Standards and Classification (22a-426)	Applicable	Applicable to aquifer restoration and discharges to the Norwalk River and the aquifer. MCLs and public health code levels will be attained to restore the aquifer to its designated use as a drinkging water aquifer and surface water discharges will meet NPDES limitations.
Standards for Quality of Public Drinking Water; Connecticut Public Health Code (19-13-B102)	Relevant and Appropriate	Cleanup of the aquifer will be conducted in accordance with these standards for water supplies.
Connecticut Discharge Permit Regulations	Applicable	Supplement the NPDES requirements. Treated groundwater discharged to a surface water must comply with water quality standards and complete routine monitoring and recordkeeping activities.
Connecticut Hazardous Waste Rules (22a-449) (Title 22a-430)	Applicable, where more stringent than federal requirements	Treatment system operation will comply with these requirements.
Connecticut Air Pollution Control Regulations (22a-174)	Applicable	Air emissions from the treatment system will comply with State air quality standards.
Connecticut Public Health Code (19a-36)	Applicable	This requirement provides controls to restrict groundwater use from private wells as potable water.

APPENDIX E

CTDEP COMMENTS, DATED AUGUST 26, 2002 ON DRAFT FIVE-YEAR REVIEW REPORT

STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION

August 26, 2002

Nancy Smith
US Environmental Protection Agency
One Congress Street, Suite 1100
Boston, Massachusetts 02114

Re: Draft Five-Year Review Report
Kellogg-Deering Well Field Site
Norwalk, Connecticut

Dear Mrs. Smith:

The Permitting, Enforcement and Remediation Division of the Connecticut Department of Environmental Protection ("CT DEP") has reviewed the report titled "Draft Five-Year Review Report, Kellogg-Deering Well Field Site, Norwalk, Connecticut" dated August 2002 ("the Report"). The Report was prepared by Tetra Tech NUS, Inc. on behalf of U.S. Environmental Protection Agency ("EPA"). EPA has requested that CT DEP, as the support agency for the Kellogg-Deering Well Field Site ("the Site"), review and comment on the Report.

CT DEP understands that a Five-Year Review should "evaluate the implementation and performance of a remedy in order to determine if the remedy is or will be protective of human health and the environment," as stated in EPA's June 2001 "Comprehensive Five-Year Review Guidance." The CT DEP concurs with the Report's statement that the remedy for OU1 is protective of human health and the environment. However, it is the position of the CT DEP that further information must be obtained before a determination of the protectiveness of the remedy for OU2 can be rendered. This belief also applies to the protectiveness of OU3 since the protectiveness of OU3 relies solely on the remedy in place at OU2.

General Comments

1. The potential for migration of vapors, from both soil and groundwater polluted with volatile organic compounds (VOCs), into Complex buildings or buildings in the Downgradient Area (OU3) has not been adequately evaluated. The CT DEP was informed in discussions with EPA staff that EPA is not concerned about migration of VOC vapors into buildings because previous indoor air monitoring in the Complex did not reveal a risk to human health.

   The CT DEP has reviewed the December 1992, "Indoor Air Monitoring Plan, Operable Unit No. 2, Kellogg-Deering NPL Site, Norwalk, Connecticut," prepared by GZA GeoEnvironmental, Inc. (GZA), and the results of the monitoring conducted pursuant to that plan. The monitoring revealed trichloroethylene (TCE) concentrations up to 0.2 parts per million (ppm) in the breathing zones of the Elinco building, which is equivalent to more than 200 times the CT DEP Target Indoor Air Concentration of 5.00 $\mu g/m^3$, or 0.00093 ppm. While we recognize that the building is currently unoccupied, we believe the potential

exposure to volatile compounds in indoor air needs to be thoroughly investigated. Further, an evaluation of shallow groundwater throughout OU2 and OU3 would be a necessary first step in determining whether other areas may be impacted from VOC vapors. Unfortunately, sampling of all but one monitoring well that could be useful in such an evaluation was discontinued in 1995. The most recent results from the one well that is sampled, MW-03, shows TCE concentrations at 14,000 ppb. These levels of TCE can cause a risk to human health, if vapors accumulate in overlying buildings. For these reasons, we believe that there is insufficient data to conclude that the remedy at OU2 is even currently protective of human health.

In addition, there is insufficient evidence to conclude that contaminated groundwater does not pose a risk to human health in OU3. The Report assumes that since the Public Health Code does not allow the installation of private water wells, there is no current or potential future exposure. However, there has not been an assessment of the risk to human health from volatilization of contaminated groundwater, and the accumulation of vapors in overlying buildings. It is important to note that, while the RSRs limit the applicability of the volatilization criteria to ground water within 15 feet of the ground surface, subsequent research has shown that accumulation of volatile organic compounds can occur even when the water table is significantly lower than 15 feet. The groundwater table in the OU2 and OU3 ranges from approximately fifteen feet (15') below ground surface (bgs) near Main Avenue to thirty-six feet (36') bgs near Sniffen Street. In the judgment of the CT DEP, this depth would not preclude vapors from migrating into overlying buildings.

CT DEP recommends that an evaluation of the shallow groundwater quality in the SRA be conducted to determine the need for further investigation into the risk of vapors migrating into buildings from both soils polluted with VOCs, and groundwater polluted with VOCs.

2. The CT DEP does not agree with the following Protectiveness Statement in the Report: "The remedy at OU2 currently protects human health and the environment because groundwater extraction and treatment and periodic SVE treatment continues to occur."

The current operational frequency for the SVE system is one (1) day on and one hundred and eighty (180) days off. Essentially, the SVE system no longer operates, and the CT DEP feels that this should be reflected in the Report. With the SVE system not operating regularly, the third objective of the SVE system, to "prevent contaminants from migrating into the indoor air of the Complex buildings from underlying soils," as stated in the 1997 Explanation of Significant Differences ("ESD"), is no longer being met. The CT DEP feels that if the SVE system is not operating, the remedy for OU2 is not protective. In addition, we are concerned that even if the SVE system as designed is operated on a meaningful basis, it may not achieve the objective of preventing the migration of contaminants into indoor air. It should be noted that the last round of indoor air samples was collected by GZA several months after the initiation of the SVE system and TCE concentrations were still elevated in the Elinco building at levels of concern to CT DEP.

3. The 1989 Record of Decision ("ROD") stated that the remedy for OU2 would permanently " reduce the level of contamination in the soil at the Source Area, and thus eliminate the migration of vapors into the buildings at the complex and prevent human exposure to this vapor." This exposure assumption is based on the fact that VOC contaminated soils can pose a risk to humans occupying buildings overlying this pollution. What the ROD did not consider is that this same exposure assumption can be true for contaminated groundwater. EPA's June 2001 "Comprehensive Five-Year Review Guidance" states that to determine the protectiveness of the remedy the five-year review must "evaluate the effects of significant changes in standards and assumptions that were used at the time of the remedy selection." Until the groundwater volatilization exposure assumption can be evaluated in both OU2 and OU3, the CT DEP believes that further information must be obtained before the protectiveness of the remedy can be determined.

4. The 1989-ROD states that the remedy for OU2 will "reduce the risk to the Norwalk River and the life it supports." The selection of a remedy for OU3, the area directly upgradient of the Norwalk River, was deferred. The CT DEP has reviewed groundwater monitoring results from monitoring wells in OU3, and found that VOC concentrations in ground water close to the Norwalk River are several orders of magnitude higher than ambient surface water quality criteria adopted in the States Water Quality Standards. While the rate of discharge and the dilution available in the Norwalk River may be such that risks to human health and aquatic life are mitigated, we believe that the discharge of contaminated ground water to the Norwalk River should more thoroughly be investigated.

5. The Report recommends that the Remedial Action Objective ("RAO") for groundwater, which requires the restoration of SRA groundwater to drinking water quality, be reevaluated to assess the technical practicability of this RAO. The CT DEP does not disagree. However, the Report should state that if technical impracticability where demonstrated, this would not effect the other three RAOs for groundwater. Therefore, groundwater remediation may still be necessary to: prevent further introduction of contaminated groundwater from the SRA into the groundwater in OU3, the Norwalk River, and the well field; and reduce VOC mass in groundwater in the SRA.

   In addition, if the technically impracticability of remediating the groundwater to drinking water standards was demonstrated, the CT DEP does not believe that this should result in altering the soil cleanup standards. The CT DEP believes that soil remediation is necessary to prevent further degradation of the groundwater, and to prevent human contact with contaminated soil, even if the groundwater is technically impracticable to fully remediate. Just because one groundwater RAO may be technically impracticable to achieve does not mean that the RAOs for soil are no longer necessary.

6. The utilization of the CT DEP's Remediation Standard Regulations ("the RSRs") has been recommended in the Report. The CT DEP agrees with the use of the RSRs for setting a framework for protectiveness of human health and the environment.

Specific Comments

1. Section 3.2.1 of the Report describes the groundwater quality outside of the well field as GB/GA. This classification is no longer used. The groundwater quality standard in this area is GA, which is defined as ground water within the area of existing private water supply wells or an area with the potential to provide water to public or private water supply wells.

   For such areas, the state's policy is to restore ground water to the extent feasible to a quality suitable for drinking without treatment.

   In addition, Section 9.2 of the Report states that if the RSRs were to be applicable, a provision of the RSRs would apply, which allows for the comparison of TCLP/SPLP results to the GWPC, times a dilution factor of 10. However, this provision is only applicable in GB groundwater areas, and there are no GB areas in OU1, OU2, or OU3.

2. The CT DEP believes it would be helpful to include a figure in the Report that shows all monitoring well locations, including those in OU3, and provide the current sampling frequency for each well.

Thank you for the opportunity to contribute to the review of the Report. We hope that these comments are helpful in conducting your review. Please feel to contact me if you have any questions relating to the Kellogg-Deering Well Field Site. I can be reached at (860) 424-4166.

Sincerely,

Graham J. Stevens
Environmental Analyst
Permitting, Enforcement and Remediation Division
Bureau of Water Management